External Thermal Insulation Composite Systems (ETICS)

Reaction to Fire

27 June 2013
Frankfurt, Germany
The European Association for ETICS - EAE
What is an ETICS?

- **External Thermal Insulation Composite System**
- Delivered as a kit (set of components from one manufacturer)
- Used for new build and refurbishment
- ETAG 004: European Technical Approval Guideline
The European Association for External Thermal Insulation Composite Systems (ETICS) is the umbrella association of

- 11 national ETICS associations;
- 4 European associations of leading suppliers (insulation materials); and
- 1 supporting company member.

EAE represents about 85% of Europe’s ETICS market.
Ordinary members

- Qualitätsguppe Wärmedämmsysteme, Austria
- IVP, Werkgroep ETICS, Belgium
- Cech pro zateplování budov, Czech Republic
- Groupement du Mur Manteau, France
- Fachverband Wärmedämm-Verbundsyste e.V., Germany
- Consorzio per la cultura del sistema a capotto, Italy
- Brancheverenigung Producenent gepleisterd Bouwen, Netherlands
- Stowarzyszenie na Rzecz Systemów Ocieplenia, Poland
- Združenie pre zateplovanie budov, Slovakia
- Verband Wärmedämmverbundsyste, Switzerland
- Insulated Render and Cladding Association, United Kingdom
Extraordinary members

- European Manufacturers of Expanded Polystyrene
- European Phenolic Foam Association
- European Insulation Manufacturers Association
- The European voice of the polyurethane insulation industry
- EJOT Building Fasteners
EAE Board

1. President
   **Lothar Bomböss**, Fachverband WDVS (Germany), Sto

2. Vice President
   **Ruud van Eersel**, IVP (Belgium), Caparol

3. Budget Affairs
   **Dominique Delassus**, G2M (France), Parex

4. Marketing Affairs
   **Werther Colonna**, Cortexa (Italy), Gruppo IVAS

5. Technical Affairs
   **Dr. Clemens Hecht**, QG Wärmedämm-systeme (Austria)
Organogram

11 ordinary members
National ETICS associations

European Association for ETICS

Board
Lothar Bombös, Germany
Ruud van Eersel, Belgium
Dominique Delassus, France
Werther Colonna, Italy
Dr. Clemens Hecht, Austria

5 extraordinary members
Sector associations/supporting company members

Management
Dr. Wolfgang Setzler
Ralf Pasker
Carmen Franke

Marketing Committee
Chairman: Gino Gaillaert (BE)

Technical Committee
Chairman: Federico Tedeschi (IT)
Major objectives

• Cross-border exchange of experiences and common efforts to further develop the use of ETICS in new built and thermal renovation of building stock:

One strong voice for ETICS in Europe!
Quality of ETICS

- Quality of planning
- Quality of components
- Quality of execution
- Quality of the system
European ETICS Market: Facts & Figures
EUROPEAN ETICS MARKET: SIZE BY REGION (2011)

- **Northern Europe**: \(\approx 1\text{\,mil.}\,1.5\text{\,m}^2\)
- **Western Europe**: \(\approx 12\%\)
  - \(\approx 8\%\)
  - \(\approx 13.0 - 15.0\text{\,m}^2\)
- **Central Europe**: \(\approx 75\%\)
  - \(\approx 120 - 130\text{\,m}^2\)
- **Southern Europe**: \(\approx 4\%\)
  - \(\approx 19.0 - 20.0\text{\,m}^2\)
- **South-East Europe**: \(\approx 1\%\)
  - \(\approx 6.5 - 7.5\text{\,m}^2\)
- In total: \(\approx 8\%\,12\%, 4\%, 75\%, 1\%\)
  - \(\approx \text{mil.} 160 - 174\text{\,m}^2\)

Source: WSM/EAE/estimation
EUROPEAN ETICS MARKET: SHARE OF INSULATION MATERIALS (2011)

In total
EPS ≈ 82 - 83%
MW ≈ 11 - 12%
Others* ≈ 5 - 7%
*PF, PU, CG, XPS, WF, WW, …

Northern Europe
EPS ≈ 70%
MW ≈ 23%

Western Europe
EPS ≈ 82%
MW ≈ 11%

Central Europe
EPS ≈ 84%
MW ≈ 12%

Southern Europe
EPS ≈ 88%
MW ≈ 9%

South-East Europe
EPS ≈ 60%
MW ≈ 25%

Source: WSM/EAE/estimation
• Average thickness in Germany: 126 mm (2012)
• Young markets catch up rapidly

Source: Fachverband WDVS (Germany)
European political objectives for 2020:

- Reduction of GHG emission by 20%;
- Reduction of energy consumption by 20%;
- Increase the share of renewable energy generation to 20%.

→ National roadmaps to improve energy efficiency

The EU’s 20-20-20 policy
to be implemented by 2020

-20%  -20%  +20%

Greenhouse gas levels  Energy consumption  Renewables in energy mix

8.5%
• **Greatest leverage**: Reduction of energy consumption of building stock

• **Potential**: savings of 700 bil. TWh – especially reduction of heating energy
ETICS and Reaction to Fire

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3.0 General remarks
Reaction to Fire – historical development

- Increasing insulation thickness
  - Before 2005 insulation thicknesses > 100 mm rare
  - New energy legislation + increasing energy costs: increasing average thicknesses

- ETICS industry (2006)
  - Series of tests to further improve fire safety
  - Large-scale tests and natural tests (real estates)

- Result
  - Introduction of fire barriers to ETICS with combustible insulation
Fire scenarios for facades

1. Brand eines benachbarten Gebäudes
2. Brand außerhalb des Gebäudes
3. Brand innerhalb eines Gebäudes

3.0 GENERAL REMARKS

Fire in the neighbourhood

Fire attack from outside (in front of the facade)

Fire attack from the interior (rooms)
Typical situation: fire starts in a single room (pictures: no insulation at all)

After 12 minutes
„flash-over“ 1st floor

After 20 minutes
„flash-over“ 2nd floor

After 25 minutes
3.1 Reaction to Fire without fire barriers
3.1 REACTION TO FIRE WITHOUT FIRE BARRIERS

Reaction to fire without additional fire barriers

100 mm EPS 15
Rendering after testing

100 mm EPS 15
Insulation after rendering was stripped → RTF acceptable
Reaction to fire **without** additional fire barriers

- Increasing pressure inside the ETICS (heated air, pyrolysis gas)
- Pyrolysis gas escapes through the rendering
- Organic content of rendering burns
- Lintel deformation
3.2 Solutions – two options
3.2 SOLUTIONS – TWO OPTIONS

Fire barriers in EPS-ETICS: two options

Strips of mineral wool above each single lintel
Prevention of fire-attack to insulation layer

Uninterrupted strips at floor level
To stop fire-attack at every second floor level

Additional measures required in case of window shades and windows installed in front of solid wall structure

No additional measures required in case of window shades and windows installed in front of solid wall structure
3.3 Option 1: fire barriers above openings
3.3 OPTION 1: FIRE BARRIERS ABOVE OPENINGS

Standard application **without** window shades and without window frames within insulation layer

Special application in case of window shades and without window frames within insulation layer
3.3 OPTION 1: FIRE BARRIERS ABOVE OPENINGS

Reaction to fire with additional fire barriers (lintel)

200 mm EPS 15
Rendering after testing

200 mm EPS 15
Insulation after removal of rendering
3.4 Option 2: surrounding fire barriers
3.4 OPTION 2: SURROUNDING FIRE BARRIERS

Fire tests Bad Salzungen/Germany

- December 2006
- Real building

⇒ Supervised by German approval body DIBt and fire brigades
OPTION 2: SURROUNDING FIRE BARRIERS

Fire tests Bad Salzungen/Germany

- Test szenario
  - Fire in one room next to the facade with flames through the window opening after fash-over
- Facade cladding
  - Bonded ETICS with flame retardand EPS (Germany: PS20, class B1) and organic rendering
- Fire barrier
  - Horizontal strips made from mineral wool or PUR/PIR with 20 mm EPS facing)
3.4

OPTION 2: SURROUNDING FIRE BARRIERS

Thermal load caused by test fire

Room:
- Floor area: 9-12 m²; height: 2.5 m
- Windows: 0.9 m (1.7 m x 1.4 m)

Fire load:
- 375 kg (resp. 475 kg) wood plus 40 – 50 l Isopropanol
- Equals 723 – 772 MJ/m²

Ventilation:
- Window completely open plus simulation of circulation by fan

Fire attacks:
- Room: 35 minutes of total fire
- Facade:
  - flash-over after 5 minutes (flames out of window opening)
  - Max. height of flames: 4 m
  - Duration of direct flame attacks: 35 minutes
ETICS with 200 mm EPS insulation + surrounding fire barrier right above the window (0.5 m)

During total fire: flames reach lintel of the window above (next floor level)

After the test: Rendering at lintel area opened; fire reached next floor level via window

After removal of rendering: Fire barrier made from PU (with 20 mm EPS facing) still in place
ETICS with 200 mm EPS insulation and MW fire barrier 3.5 m above the window

During total fire: flames reach lintel of the window above (next floor level)

After the test: Rendering at lintel area opened; fire reached next floor level via window

After removal of rendering: Fire barrier made from MW still in place
Details for design and execution of ETICS
Details for design and execution of ETICS

3.4 OPTION 2: SURROUNDING FIRE BARRIERS

Fire walls: to be covered with non-combustible insulation material

Fire walls: to be covered with non-combustible insulation material
3.5 Fire from outside
Fire attack from outside: plinth situation

Situation with fire at plinth areas:
- Immediate flame attacks on the ETICS
- Flames will reach windows at facades with and without insulation
Fire incident in Hamburg/Germany 27/04/2012

Fire caused by 2 motor bikes in front of the facade

- Ground floor and first floor immediately affected
- Due to tremendous heat windows burst up to the forth floor
- Smoke in appartments
- ETICS with non-combustible insulation
Fire test of fire brigade in Graz/Austria in September 2007

Ignition of two waste containers right in front of the facade

Bonded ETICS with 100 mm EPS insulation and organic render system; without plinth (= open from below) → No serious damages despite application mistake

Only local damages
Conclusion
Test results show:

- Organic content of render systems burns in a very limited area of the facade and does not support vertical or horizontal extension of the original fire
- Original flame is not enlarged significantly
- No or limited risk of droplets

„Approved ETICS properly installed and maintained are safe in use“ (German parliamentary commission involved in investigation of fire safety of EPS-ETICS)

- Further tests regarding reaction to fire of plinths
- Evaluation of improvements on construction sites
- ETICS industry takes fire safety seriously
- Adaption of latest results
- Open for exchange of experience
Thank you for your attention!

www.ea-etics.com